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APPLICATION AND EVALUATION OF SATELLITE REMOTE SENSING DATA AND AUTOMATIC PROCESSING TECHNIQUES FOR STATE-WIDE LAND USE AND OTHER RESOURCE MANAGEMENT

LANDSAT FOLLOW-ON INVESTIGATION #20820

(CONTRACT NO. NAS5-20918

P. T. BANKSTON, PRINCIPAL INVESTIGATOR

OFFICE OF SCIENCE AND TECHNOLOGY

OFFICE OF THE GOVERNOR

416 NORTH STATE STREET, SUITE 5

JACKSON, MISSISSIPPI 39201

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PROGRESS REPORT FOR QUARTER ENDING JULY 21, 1976

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GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND 20771

INTRODUCTION

This report summarizes activities under the State of Mississippi's LANDSAT Follow-on Investigation, for the period ending July 21, 1976. This effort involves joint activities with the NASA/JSC Earth Resources Laboratory at Bay St. Louis, Mississippi, and with a number of key state agencies. The Office of Science and Technology (Office of the Governor) provides overall project management, and coordinates the multi-agency participation.

This reporting period constitutes the fifth quarter of operations under the contract. During this period, significant progress has been made in the processing of LANDSAT data, using NASA-developed pattern-recognition software on state computers. Consequently, efforts are proceeding toward achieving the major objectives of the investigation - the software conversion and subsequent production of specific resource inventories.

The contents of this report are organized consistent with prior reports and will serve as an update, with minimum repetition of previously reported information.

A. PROBLEMS

During this quarter no problems were encountered which would impede the investigation.

B. ACCOMPLISHMENTS

Progress continues in major task areas of the investigation, as follows:

1. Software Conversion Effort The initial objective of the software conversion effort has been to adapt the NASA/ERL pattern recognition and geo-referencing programs to run on the state computers (IBM 370/155) efficiently enough to attempt a statewide classification from LANDSAT CCT's. Using sample tapes provided by ERL, test runs were made through each of the programs to check them out on the IBM system. Results of these test runs indicated that the software was ready for initial use. Some additional modification of the programs is anticipated for optimization purposes. However, we decided to undertake an initial statewide classification to gain valuable experience with the system before attempting to optimize.

2. Acquisition of Spacecraft Data During this quarter we received the CCT's for the January 1976 clear coverage of the state. This data, along with the October 1975 data previously ordered and received, gives us two coverages of the state in different seasons.

3. Statewide LANDSAT Classification Work on the statewide surface cover classification was begun during the previous quarter and continued throughout this reporting period. This is an extensive effort, involving the analysis and processing of data from all or most of seven

LANDSAT frames and smaller portions of three others. The data is from contiguous, clear passes of LANDSAT-2 in October 1975. The general flow of operations through the PATREC system can be briefly described as follows:

1) ERTREF - This program reformats a LANDSAT Computer Compatible Tape (CCT) to a raw digital data tape (REFTAPE) which serves as the input data tape for subsequent programs (DAPIDS, ISOFLD, and ASSIGN) of the PATREC system.

2) DAPIDS - This program creates a display tape from the four channel raw data tape (REFTAPE). The display tape can then be used to output the LANDSAT image on an image display system or gray scale plotter, for the purposes of scanning the raw data and/or training sample selection.

3) Training Sample Selection - This is the process by which an individual specialist visually locates and circumscribes in the data training fields corresponding to the ground truth sample data collected in the field. Although it is possible to use gray scale plots or line prints in this process, by far the most efficient methods utilize a digital image display system which employs a CRT color monitor.

4) ISOFLD - This program takes the training sample locations derived in Step 3 and isolates the data for the various training fields, thus producing a training field tape (ISOTAPE).

5) STAT - This program takes the ISOTAPE and calculates statistics on the various training fields. These statistics are then analyzed and grouped to form spectral signatures for the land cover classes identified in the training fields.

6) ELIPSE - This program takes the STAT output tape and builds look-up tables for the spectral signatures, so as to facilitate the final classification process.

7) ASSIGN - This program utilizes the raw data REFTAPE and the look-up tables to do an element-by-element, maximum-likelihood classification of the LANDSAT scene. It produces the classified tape (CLSTAPE).

In performing a classification, the data is normally handled on a frame-by-frame (LANDSAT scene) basis. However, it is possible to work on several frames, concurrently, to keep the process flowing. Thus, different frames will be in different stages of PATREC processing. As of the end of this quarter, classification has been completed on three frames, and the remainder are in process. For the state as a whole, the classification is considered 60% complete.

C. SIGNIFICANT RESULTS

None to report as yet.

D. PUBLICATIONS

None to report as yet.

E. RECOMMENDATIONS

None to report as yet.